islands. (1) Relation of native state to British government. (2) Government of British India. (3) Non-British states in India. Locate Portuguese India, French possessions, Nipal and Bhutan. Why not under British rule?

XIV. *History.*— Brief history of India. Compare with the history of China. Influence of religion on the lack of historic interest of the Aryan Indians. Has British rule been beneficial or detrimental to India? Why? What is your solution of the famine trouble?

EXPRESSION: Model and draw, in color, relief map of India in dry and wet seasons. Draw a typical Asiatic Indian.

MATERIALS: The subject will be illustrated by photographs, stereopticon views, products of India, manufactured and natural, books and work of Indian school children.

REFERENCES: *Statistical Atlas of India*, 1895; Mill, *International Geography;* Stanford, *Compendium of Asia*, Vol. II; Reclus, *Earth and Its Inhabitants*, Vol. III; Hunter, *The Indian Empire*, and *Brief History of Indian People;* Murray, *Hand-Book of India, Burma, and Ceylon;* Alfred Lyall, *The Rise and Expansion of the British Dominion in India;* Ferguson, *History of Indian and Eastern Architecture.*

The above outline is intended as an aid in the study of the subjects herein considered. Such part of it will be completed during the summer term as time permits.

MATHEMATICS.

GEORGE W. MYERS AND GERTRUDE VAN HOESEN.

THE TEACHING OF MATHEMATICS IN THE SECONDARY SCHOOL.

GEORGE W. MYERS.

IT is believed that a sound method of presenting mathematical truth will give due consideration to both theory and practice. Theory without practice is apt to be inert and inane, while practice without theory is dangerous, if not wasteful. Due regard will be paid to both these aspects of mathematical training, so far as time will admit, though special stress will rest upon "the doing" as a means to "the knowing." The construction and use of inexpensive apparatus for field work in connection with geometry, astronomy, and geography will be given some attention.

I. A general survey of the subjects of geometry, algebra, and trigonometry with reference to their underlying principles.

II. The amount and kind of geometrical and algebraic training with which the pupil should enter the high school.

III. The purpose of geometry and algebra in the secondary school, and the relation of these sciences to other subjects of the high school: (1) For students who will not go beyond the high school. (2) For students who expect to attend a university, or technical school. (3) Use of home-made apparatus.

IV. Should algebra and geometry be taught simultaneously? (1) Considered from standpoint of subject-matter. (2) Considered from standpoint of teacher's preparation.

V. The practical aim of the study of algebra is a working knowledge of the equation; the theoretical aim is a study of functions. (1) The use of graphical methods. (2) Study of the equations needed in mechanics and other branches of physical science.

VI. Exemplification of algebraic principles by arithmetical numbers.

VII. The proper place for teaching of quadratic equations, radicals, and logarithms.

VIII. Classification and study of algebraic equations with reference to degree.

IX. A study of factoring with reference to the following three principles: (1) A factor of each term of a polynomial is a factor of the polynomial. (2) The difference of like powers of two numbers is divisible by the difference of the numbers whenever the exponent of the powers is an integer. (3) If an algebraic expression of nth degree (n being a positive integer) in x vanishes when x is replaced by r, $x-r$ is a factor of the expression.

X. Field work in geometrical surveying.

XI. The preparation of plans for teaching typical lessons.

XII. The place and relation of high-school trigonometry.

THE TEACHING OF INTERMEDIATE ARITHMETIC.

GEORGE W. MYERS.

I. Reasons urged in the past for the teaching of arithmetic: (1) The necessities of measurement and valuation. (2) A good introduction to philosophy (Aristotle). (3) Requirements of business in casting and keeping accounts. (4) Demands of scientific classification and industrial conditions. (5) Other reasons and validity of those enumerated.

II. Reasons for teaching arithmetic today: (1) Demands of mental discipline and culture. (2) To train the number sense. (3) To give the mind an efficient tool for the adaptation of physical and industrial forces to human needs.

III. A survey of the scope of the work to be covered from the fifth to the eight grade, inclusive.

IV. The origin, nature, and function of the number idea in measurement and counting. (1) Four stages to be passed before number becomes a really useful factor in thinking. (2) Province of inductive and of deductive methods in the grades. (3) The function, importance, and mode of securing the necessary drill in the arithmetical operations.

V. What should be the abstract outcome of the number work of Grades I–IV?

VI. Distinguishing characteristics of number work of Grades V–VIII. (1) Place, kind, and relation of the geometrical and algebraic work of these grades. (2) Changes needed in the seventh and eight grades to adapt the work of the grades to that of the high school.

VII. What arithmetical subjects may be regarded as of so little educative or practical value that they may give way to the algebra and geometry? (1) Subjects not adapted to modern scientific and industrial conditions. (2) Subjects that may be more economically treated by the methods of the advanced mathematics. (3) Subjects in which the language alone constitutes the difficulty.

VIII. Qualifications of a good teacher of modern intermediate arithmetic.

IX. Essential characteristics of a good text-book for intermediate arithmetic.

X. Relation of the arithmetic to other lines of work.

XI. Field and laboratory work for intermediate grades.

XII. Preparation of plans and doing of field work.

PRIMARY MATHEMATICS.

GERTRUDE VAN HOESEN.

LABORATORY COURSE.

THIS course has been planned with the year's work as a basis. When the data have been obtained, the work will be considered from the standpoint of adaptation to grade. In order to do this, special attention will be given to the teaching of the fundamental operations, fractions, and decimals, wherever the work demands their use.

SOILS.

I. Classification in relation to locality, *i. e.*, garden, farm, swamp, forest, or lakeshore. (1) Examination as to mechanical constituents. (2) Examination as to properties: (*a*) percolation of water; (*b*) capacity to prevent evaporation; (*c*) capillarity; (*d*) inference in regard to the percentage of the

different constituents in the various soils. (3) The relation of the earthworms to good soil. (4) Examination of soils in regard to physical constituents.

II. Examination of plants from the different localities. (1) Does the difference in soil affect the constituents or growth of the plants? (2) Comparison of plants from the different areas as to roots, stem, and leaves.

WATER.

The relation of moisture to plant life. (1) Proof that plants absorb water. (2) Relation of the amount of water absorbed to the amount transpired. (3) Relation of the amount transpired to the leaf area. (4) Estimate the amount of water transpired from a small tree. (5) How much water has the tree at its disposal? (*a*) Find the volume of soil within reach of the roots. (*b*) Estimate the amount of water in this soil. (6) Effect of transpiration from land covered with forests. (7) Study of evaporation. What affects the rate? (8) What amount of water is added to supply already in soil? Keep record of rainfall. (9) Use of water to the plant. (*a*) Test samples of the water which has transpired and that which the roots absorb. Inference. (*b*) Find the constituents of the fruit, leaves, wood, and soil of different trees.

TEMPERATURE.

Relation of temperature to growth. Use the sunshine and weather charts to find some of the causes for the change in the landscape.

GROWTH.

Determination of the growth of trees. The use of the records made of the physical measurements of the children.

The problems that come up in connection with manual training and cooking, and those also that the teachers wish to solve in connection with their other work, will be considered in this course.

SPEECH, ORAL READING, AND DRAMATIC ART.

MARTHA FLEMING.

THE training in these classes will be adapted to the needs of the teachers in the schools.

The division of the class into primary- and grammar-grade teachers is nominal. The work of the two divisions will be practically the same, and, if necessary, can overlap.